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ABSTRACT

Utilization of the principles of instructional systems development and of educational technology can eliminate the inadequacies of instructional program development by the (usually untrained) teacher responsible. The four military services have created an interservice committee on Instructional Systems Development, which has created an instructional development model with divisions into three major phases of system design, system development, and instructional delivery. The procedures developed essentially imitate the cardinal principles of good management. Faced with unacceptable alternatives, the Navy decided to gather at a single site the experts in the field to actually design the instructional programs for the instructors. The management of the Naval Education and Training Program Development Center, which has 270 persons and expects 400 more, requires careful coordination and control to ensure that each persons's specialties are used appropriately. (WH)

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"THE INSTRUCTIONAL SYSTEMS DEVELOPMENT FUNCTION--
HOW TO GET IT DONE"

A presentation delivered before the annual convention of

THE NATIONAL SOCIETY FOR PERFORMANCE AND INSTRUCTION

Miami Beach, Florida, 17 April, 1974

The activity which is variously described as the systems approach to course design, the engineering approach to instruction development, instructional systems design or any of a number of other names might be defined as the application of sound management techniques to the art and science of instruction. Following some comments intended to give you a feel for the scope of the problem of instituting such activities in the Naval Education and Training Command, it is our plan to look at these management techniques as they are being applied to Navy education and training.

Although education and training in the Navy has been going on since the days of John Paul Jones, until two years ago it was conducted under many sponsors for many different purposes, all without central management and direction. With the advent of the Education and Training Command all such activity in the Navy has been brought under one control, but the enormity of that task may be appreciated by a look at some numbers:

There are 300 schools to be managed.

There are (today) 4,428 courses to be taught.

There are 82,413 students in the system on any day.

This year's budget is $1.4 billion.

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Historically in the Navy, and in the rest of the world of education and training for that matter, instructional programs have been developed by the teacher who was responsibile for a particular area of subjects. Geography teachers developed instruction in geography, and in the Navy, torpedomen developed courses of instruction intended to teach others how to be good torpedomen. We can reasonably say, then, that if we have 4,428 courses, as we have, that we have roughly 4,428 different approaches to course design, some good, some mediocre, and some very bad indeed. And to further confound the problem, our instructors come and depart at two or three year intervals, so that instructional programs take on the look of a cake prepared by a series of five cooks.

Today instructional systems developers know better, and in the best circles teachers are being urged and helped to understand that instruction must be objectively and systematically designed. People who are experts at this kind of activity are known as educational or instructional technologists, graduate degrees are now being granted in this discipline by several top flight universities, and, at least in the military, the systems approach to course design is spreading at a very rapid rate indeed.

As an example of the earnestness with which military educators and trainers view the importance of the application of instructional technology to program design and development, the chiefs of the four services' training establishments last summer created an interservice committee on ISD or Instructional Systems Development. This committee, with representatives from each of the four services, is tasked with the creation of an interservice model for ISD to all services, with the

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production of a manual to describe how to design a program of instruction in accordance with the model, and with training programs to teach people how to apply the manual. This ambitious program is well underway, and will represent a major step forward in the standardization of ISD procedures. The interservice model has now received the approval of the four training staffs, and with your indulgence we will take a look at the flow diagrams which describe it. The procedure is divided into three major phases of system design, system development and instruction delivery. (See figure 1). As we walk rapidly through these phases, please keep in mind that what we see is a synthesis of four different schema which represented the models of each of the services. The numbers of steps ranged from five in the Air Force model to nineteen in the Army model, with the Navy and Marines falling in between. The important thing is not, of course, the number of steps, but the thoroughness with which the process is described by the model, and it is the consensus of the committee that nothing should be left to the assumption that it is too obvious to be addressed.

This (see figure 2) is the design phase, and although each of the steps is very important, the two most critical are the analysis of the job...what is it our student is expecting to be able to do when he has successfully completed the instruction...and the development of the learning or behavioral objectives. Objectivity is the name of the game in good instructional system design; the statements of these objectives in terms of performance, standards and conditions is absolutely critical.

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This (see figure 3) is the development phase, and here again we will not go into each step, but rather emphasize the more significant of the steps, which are those of selecting the methods and media by which the instruction is to be delivered. Notice a step which calls for the review of existing materials which might fill the new requirement...too often we are guilty of developing new materials to suit our need when the learning library may very well contain more than adequate materials already available. This is especially so in the military services where for years we have developed training programs pretty much independently of one another. Please also note the bottom box which calls for a quality control step at this point in the development process.

Finally (see figure 4) we come to phase three, which is that of delivering the instruction to the students. Such questions as the degree of individualization of the instruction, whether to manage it by computer, the kinds of instructional talents required, how to introduce the program into the system and how to evaluate the total program in its ultimate setting, are those which are answered here.

Having been taken through this laborious process, let us note the significant point that what has been described is in reality a beautiful example of the application of the classical concept of good management procedures. Although there are variations of detail among and between scholars of management, most of them would find the following set of functions acceptable as a statement of what management really is.

Planning is the process of determining, after a look at the alternatives, of what to do. It would be reasonable to describe the ISD step of "design" as the planning phase of management.

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Organizing is the process of deciding how to get the plan executed, and again I believe it would be reasonable to say that the ISD "development" phase can be viewed as the organizing phase of good management.

Controlling is the process of taking whatever actions are necessary to insure that the plans are carried out, and is analogous to the ISD step we call the delivery phase.

Finally, evaluation is that absolutely essential step in good management which tells us whether the plan is a good one and whether or not it is being properly executed. It must be ongoing throughout every step of the ISD process as it should be in any process.

Now the purpose in all that elaborate build-up has been to make the point that the design, development and delivery of good instruction is a management process of major magnitude. It is a process of major magnitude even if one has a single instructional program to develop, with plenty of skilled educational technologists handy to explain the process to him

If, on the other hand, one has 4,428 current programs if instruction to be re-structured in accordance with the best tenets of ISD, not to mention new programs to meet new requirements coming in every day, and very, very few skilled educational technologists to help, the management process we call ISD is monumental in the degree of its difficulty. Is it reasonable to believe that one could train 15,000 instructors spread throughout 300 schools to be sufficiently skilled in ISD that they could design high quality instruction? Or could one train a sufficient number of educational technologists to distribute across

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300 schools, so that each school could do its own thing? Last year the Navy Education and Training Command reached the conclusion that it could afford neither of these alternatives, and that the only course open was a third alternative...bring those scattered, few instructional technologists available throughout the command to a single site, augment them with writers, task analysts, methods experts, media specialists and criterion authors, and do the job for the instructors. That was a very rough decision to make, because it had to be made in the face of many traditionalists who, to this day, are absolutely convinced that such an arrangement is doomed to failure. Perhaps the military is the only setting in which such a decision could be made and have expectations of being carried out, and the success or lack of it which will be experienced can serve as either a road for others to follow or a monument to a great experiment.

The new establishment for the management of Instructional Systems Development was established last January at Pensacola, Florida, and is known by the impressive title of "Naval Education and Training Program Development Center". Just to give evidence that the Navy is serious about this change in the traditional way things are done, it can be said that there are already 270 persons on board, with another 400 to join in the comming months.

The management of these instructional program development managers presents a nice problem in organization. This (see figure 5) figure represents the normal administrative organization into which most institutions are molded. It allows people with like interests and skills to be physicaliy together and to attend to one primary function, and it

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allows for ease in performing such routine tasks as personnel administration, performance evaluation, payroll record keeping, mail routing and so on. It is a fairly necessary way to organize, but it is totally unsatisfactory for the kinds of management tasks envisioned for the Program Development Center. This enigma has been solved by a system sometimes known as "matrix management", and it works as follows. (See figure 6). In addition to being administratively organized along the lines just described, there is a second organizational structure which prevails only when it is required. Every person in the institution who might play a role in the execution of the kinds of tasks the institution has in its mission is listed along one ordinate of the matrix, while all the skills which might be required in the carrying out of any assigned task are listed along the other ordinate. Now when the manager of the managers receives a new task assignment he may go to his matrix, note those who are available for tasking, and puts together a team which represents the optimum mixture of skills to do the job. These people are assigned to a leader, and they are from that moment on disengaged from the administrative organization (except on payday!) until the job is completed.

I wonder if, in casting your eyes down the vertical ordinate of the matrix, you noticed that an essential input to any instructional program development is missing...take another look and you will note that there are no subject matter experts...nobody who knows <u>what</u> to teach! It is very important that the task analysts come back from a job survey and tell us that an apprentice boiler technician must be

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able to maintain the proper level of feed water in the boiler, but who is going to supply the necessary information about how to do that so that it may be a part of the instructional program? Obviously a trained boiler technician is the best source, and fortunately there is always a good supply of experienced boiler technicians at the boiler technician school. So we have elected to utilize that source of subject matter knowhow, and two very important needs are fulfilled...first of all we get the very best available information, but equally importantly, we involve the people who will teach the course in the development thereof, an absolute necessity if we are to expect their acceptance of the program when it reaches the schoolhouse ready for them to put into use.

To round out the role of the Education and Training Program Development Center, let me mention that it will also be the source for all training publications, programmed instruction materials, visual aids, correspondence courses, promotion examinations and audio materials. Because the kinds of people who can produce master copies of these kinds of things are also the kinds of people who are needed to design and develop instructional programs, we will have created a critical mass, if you will, of the very best professional skills necessary to produce the very best instructional programs, which is our aim and goal.

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FUNCTIONAL SCHEMATIC DIAGRAM FOR INSTRUCTIONAL SYSTEMS DEVELOPMENT

THREE MAJOR PHASES

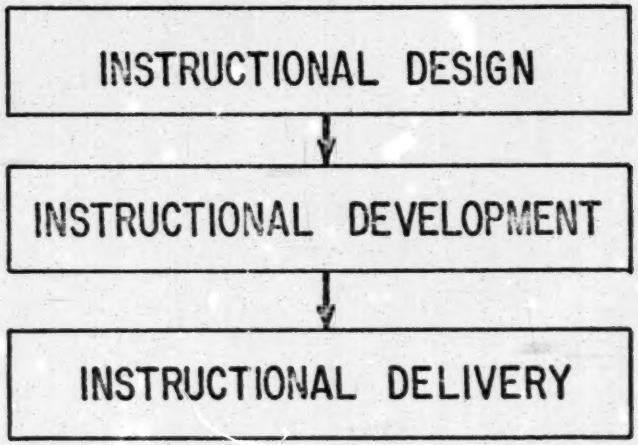

Figure 1.

FIGURE 2

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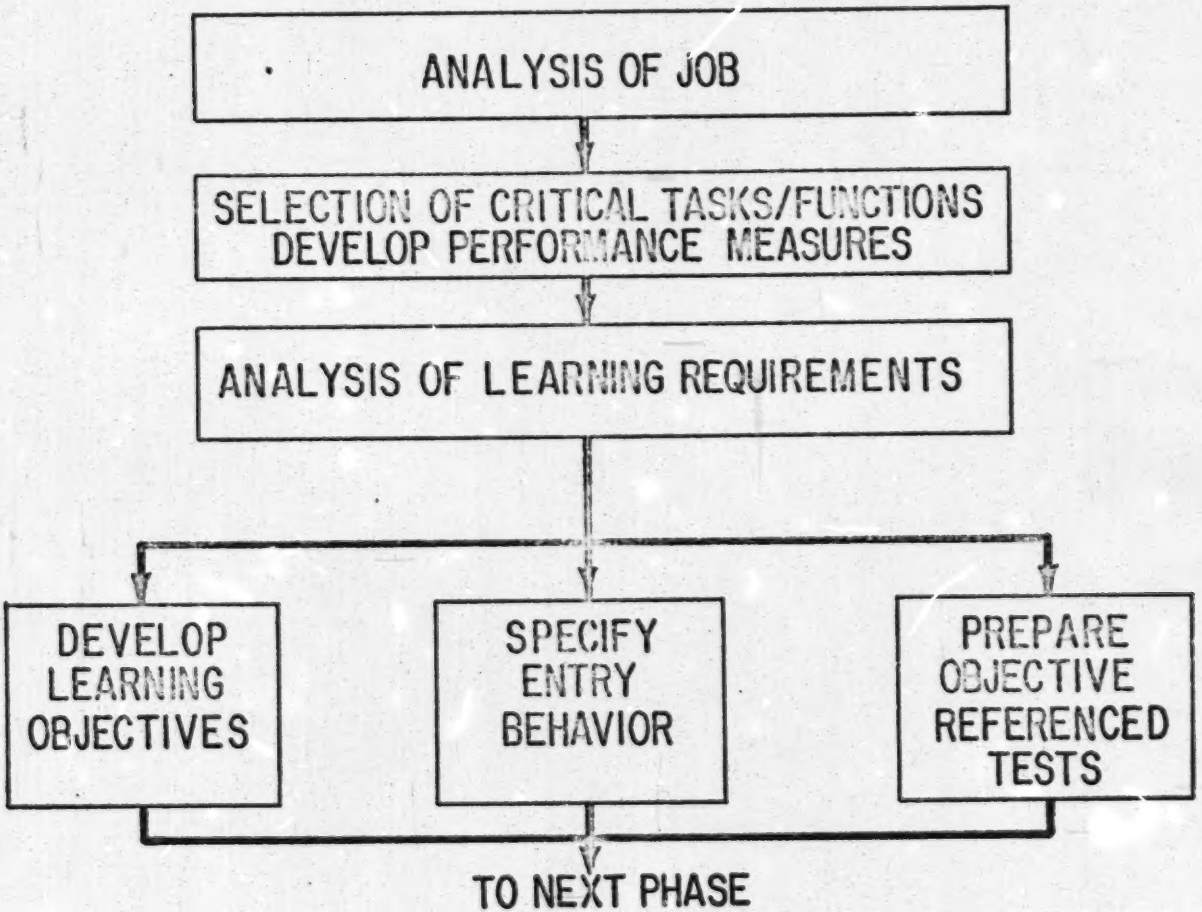
PHASE I... INSTRUCTIONAL DESIGN



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PHASE II...INSTRUCTIONAL DEVELOPMENT

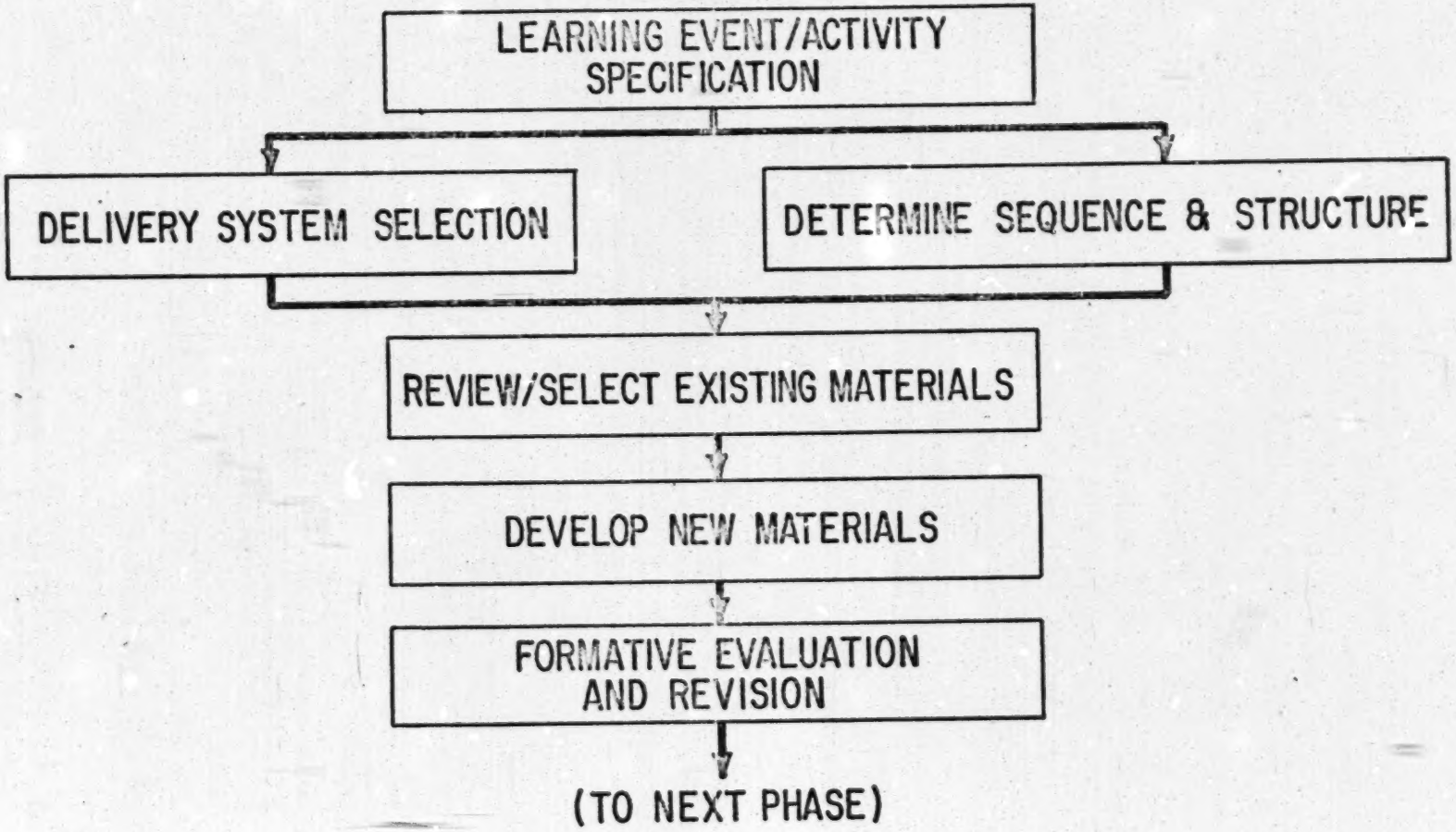

Figure 3.

PHASE III: INSTRUCTIONAL DELIVERY

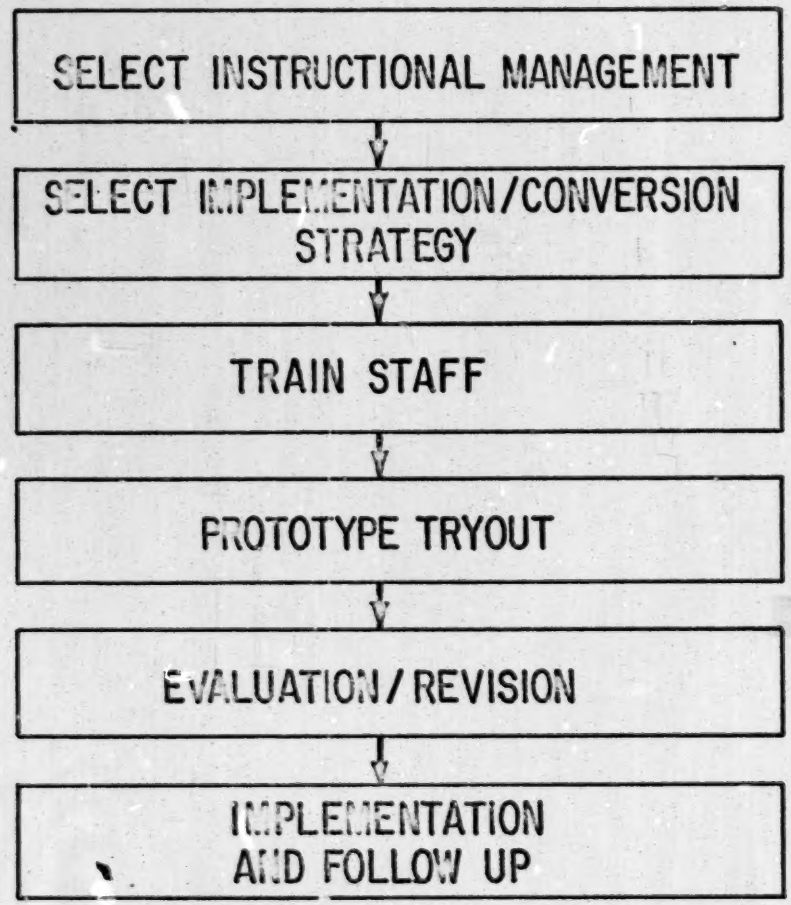

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FIGURE 4

Figure 4.

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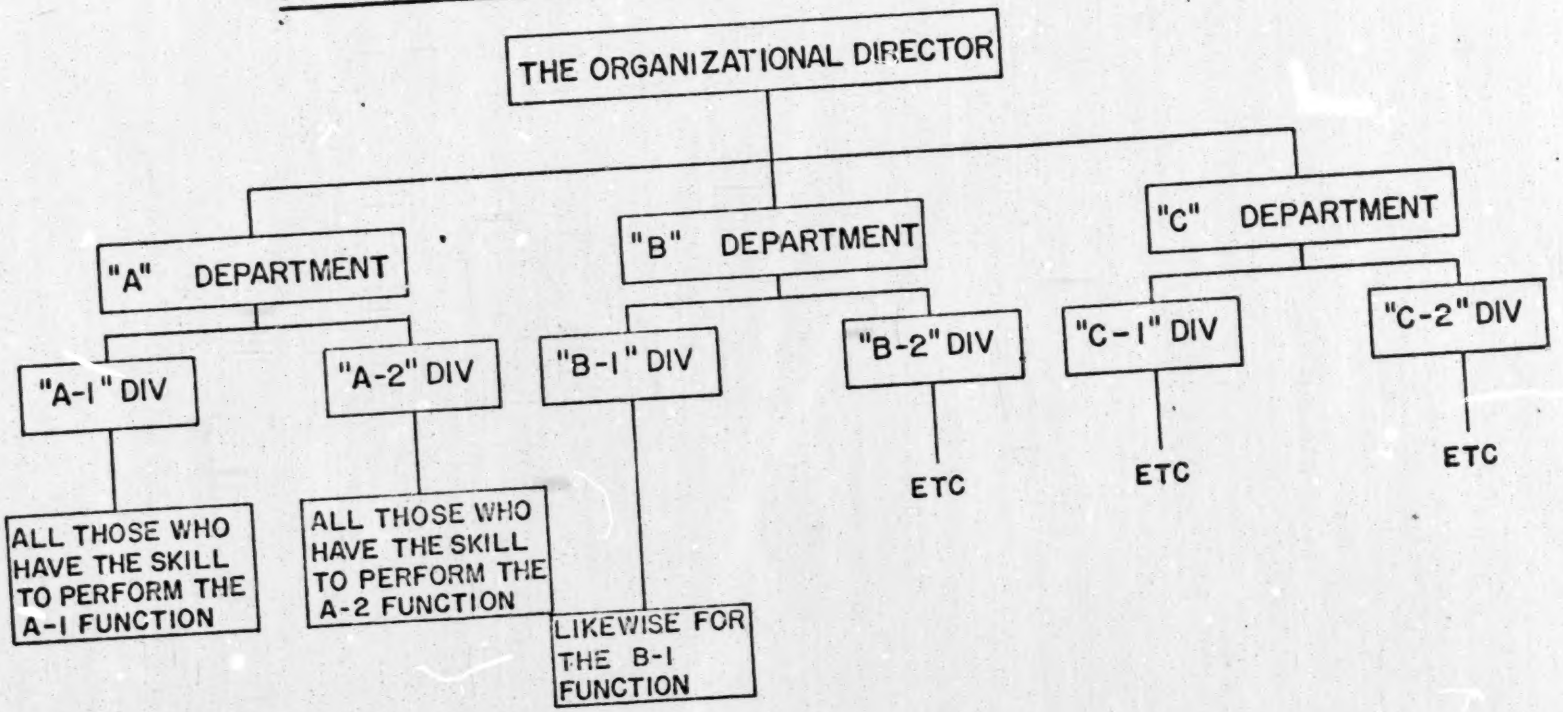
A TYPICAL ADMINISTRATIVE ORGANIZATION



PLUS CLERICAL AND OTHER SUPPORT ACROSS THE ORGANIZATION

Figure 5.

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A MATRIX FOR MANAGEMENT

SKILL	PERSONNEL BY NAME											
	A	B	C	D	E	F	G	H	I	J	K	L
TASK ANALYSIS							X					
WRITING PERFORMANCE MEASURES					X							
WRITING BEHAVIORAL OBJECTIVES											X	
TEXT AUTHORS									X			
PROGRAMMED TEXT AUTHORS	X											
METHODS EXPERTS				X								
MEDIA EXPERTS			X									
AUDIO/VISUAL EXPERTS						X						
INSTRUCTOR TRAINERS								X				
EVALUATORS		X										
CLERICAL										X		X

Figure 6.